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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,561	08/19/2003	Hsueh-Yuan Pao	IL-11028	6617

7590 05/17/2006  
Deputy Laboratory Counsel For Intellectual  
Property  
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EXAMINER

FILE, ERIN M

ART UNIT	PAPER NUMBER
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2611

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/644,561	PAO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Erin M. File	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 February 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 June 2005 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. In view of the appeal brief filed on February 17, 2006, PROSECUTION IS HEREBY REOPENED. A non-final rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31. A new notice of appeal fee and appeal brief fee will not be required for applicant to appeal from the new Office action. Any appeal brief filed on or after September 13, 2004 must comply with 37 CFR 41.37.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang and in further view of McCullough.

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**Claim 1, 7, 12**, Zhang discloses a serial-to-parallel data converter which converts a string of serial data to a plurality of parallel data (fig. 1, 21), an in-phase/quadrature mapper that receives parallel data and determines its I and Q locations (fig. 2, 47, col. 5, lines 21-40), a plurality of look-up-tables (LUTs) operatively connected to receive and store said I and Q locations, wherein the in-phase LUTs are configured  $I_1$  to  $I_N$ , and quadrature LUTs are configured  $Q_1$  to  $Q_X$  (abstract, fig. 6B, col. 5, lines 21-40); adders are used to create data streams of each of I and Q locations stored within data buffers, registers to collect and store  $IQ_1$  to  $IQ_{IQN}$  (col. 5, lines 10-46); a digital to analog converter operatively connected to convert said output data comprising  $IQ_1$  to  $IQ_{IQN}$  to analog data (fig. 2, 53). Zhang further teaches the data is configured  $A_1$  to  $A_{AN}$ , for each of I and Q added to produce IQ data (fig. 7, col. 6 line 62-col. 7 line 7). Zhang fails to disclose a quadrature amplitude modulator which does not include a multiplier, McCullough discloses an architecture for a universal modulator which can function in a variety of modes including QAM without the use of multipliers (fig. 1, col. 1, lines 21-30). Zhang teaches a quadrature amplitude modulator which meets all of the limitations of the disclosed invention, and further teaches his invention significantly reduces the number of multipliers (abstract). McCullough teaches a modulator which can function in a variety of modes including quadrature amplitude modulation and does not disclose the use of any modulators. The use of multipliers is computationally intensive. Zhang's disclosure teaches away from the use of multipliers in his modulation technique, claiming an increase in the efficiency of the modulation. For these reasons it would be

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obvious to one skilled in the art at the time of invention to incorporate McCullough's modulation technique into Zhang's invention.

**Claims 2, 8, 10**, Zhang discloses a serial-to-parallel data converter which converts a string of serial data to a plurality of parallel data (fig. 1, 21); in-phase/quadrature mapper that receives parallel data and determines its I and Q locations (fig. 2, 47, col. 5, lines 21-40); a plurality of look-up-tables (LUTs) operatively connected to receive and store said I and Q locations, wherein the in-phase LUTs are configured  $I_1$  to  $I_N$ , and quadrature LUTs are configured  $Q_1$  to  $Q_x$  (abstract, fig. 6B, col. 5, lines 21-40); a adders to receive and add I and Q locations stored within LUTs, wherein adders are configured  $A_1$  to  $A_{AN}$ , wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising  $IQ_1$  to  $IQ_{IQN}$  (fig. 6B); registers to collect and store  $IQ_1$  to  $IQ_{IQN}$  (col. 5, lines 10-46); at least one multiplexer to collect from registers the subscript output data comprising only odd subscript output data from said output data comprising  $IQ_1$  to  $IQ_{IQN}$  (fig. 3B); at least one multiplexer to collect from said plurality of registers the subscript output data comprising only even subscript output data from said output data comprising  $IQ_1$  to  $IQ_{IQN}$  (fig. 3A); and a digital to analog converter operatively connected to convert said odd subscript data and said even subscript data to analog data (fig. 2, 53). Zhang fails to disclose a quadrature amplitude modulator which does not include a multiplier, McCullough discloses an architecture for a universal modulator which can function in a variety of modes including QAM without the use of multipliers (abstract). Zhang teaches a

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quadrature amplitude modulator which meets all of the limitations of the disclosed invention, and further teaches his invention significantly reduces the number of multipliers (abstract). McCullough teaches a modulator which can function in a variety of modes including quadrature amplitude modulation and does not disclose the use of any modulators. Because of Zhang's disclosure teaches away from the use of multipliers in his modulation technique, claiming an increase in the efficiency of the modulation, it would be obvious to one skilled in the art at the time of invention to incorporate McCullough's modulation technique into Zhang's invention.

**Claims 3, 5, 9, 11**, Zhang meets all the limitations of claims 3, 5, 9, and 11, (see above paragraphs) except disclosing the exact multiplexer configuration wherein  $n \times 2$  multiplexers are used. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use various permutations of multiplexers since it is well-known in the art that there are multiple ways to translate multiple signals into one output. For instance, Zhang could use two  $4 \times 2$  and two  $2 \times 1$  multiplexers to substitute for one  $8 \times 1$  multiplexer. In addition, applicant has not disclosed that  $n \times 2$  multiplexers provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with one  $8 \times 1$  multiplexer because it would reduce FPGA programming complexity. Therefore, it would have been obvious to one of ordinary skill in this art to modify Zhang to obtain the invention as specified in claims 3, 5, 9, and 11.

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**Claim 4**, Zhang discloses a plurality of look-up-tables (LUTs) operatively connected to receive and store said I and Q locations, wherein the in-phase LUTs are configured  $I_1$  to  $I_N$ , and quadrature LUTs are configured  $Q_1$  to  $Q_X$  (abstract, fig. 6B, col. 5, lines 21-40); a adders to receive and add I and Q locations stored within LUTs, wherein adders are configured  $A_1$  to  $A_{AN}$ , wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising  $IQ_1$  to  $IQ_{IQN}$  (fig. 6B); registers to collect and store  $IQ_1$  to  $IQ_{IQN}$  (col. 5, lines 10-46); at least one multiplexer to collect from registers the subscript output data comprising only odd subscript output data from said output data comprising  $IQ_1$  to  $IQ_{IQN}$  (fig. 3B); at least one multiplexer to collect from said plurality of registers the subscript output data comprising only even subscript output data from said output data comprising  $IQ_1$  to  $IQ_{IQN}$  (fig. 3A); and a digital to analog converter operatively connected to convert said odd subscript data and said even subscript data to analog data (fig. 2, 53). Zhang fails to disclose a quadrature amplitude modulator which does not include a multiplier, McCullough discloses an architecture for a universal modulator which can function in a variety of modes including QAM without the use of multipliers (abstract). Zhang teaches a quadrature amplitude modulator which meets all of the limitations of the disclosed invention, and further teaches his invention significantly reduces the number of multipliers (abstract). McCullough teaches a modulator which can function in a variety of modes including quadrature amplitude modulation and does not disclose the use of any modulators. Because of Zhang's disclosure teaches away from the use of multipliers in his modulation technique, claiming an increase in the efficiency of the modulation, it



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would be obvious to one skilled in the art at the time of invention to incorporate McCullough's modulation technique into Zhang's invention.

**Claim 6**, Zhang discloses a plurality of look-up-tables (LUTs) operatively connected to receive and store said I and Q locations, wherein the in-phase LUTs are configured  $I_1$  to  $I_N$ , and quadrature LUTs are configured  $Q_1$  to  $Q_X$  (abstract, fig. 6B, col. 5, lines 21-40); a adders to receive and add I and Q locations stored within LUTs, wherein adders are configured  $A_1$  to  $A_{AN}$ , wherein each I and Q having a particular subscript are added in the adder having the same subscript to produce output data comprising  $IQ_1$  to  $IQ_{IQN}$  (fig. 7, col. 6 line 62-col. 7 line 7); registers to collect and store  $IQ_1$  to  $IQ_{IQN}$  (col. 5, lines 10-46); a digital to analog converter operatively connected to convert said odd subscript data and said even subscript data to analog data (fig. 2, 53). Zhang fails to disclose a quadrature amplitude modulator which does not include a multiplier, McCullough discloses an architecture for a universal modulator which can function in a variety of modes including QAM without the use of multipliers (abstract). Zhang teaches a quadrature amplitude modulator which meets all of the limitations of the disclosed invention, and further teaches his invention significantly reduces the number of multipliers (abstract). McCullough teaches a modulator which can function in a variety of modes including quadrature amplitude modulation and does not disclose the use of any modulators. Because of Zhang's disclosure teaches away from the use of multipliers in his modulation technique, claiming an increase in the efficiency of the modulation, it



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would be obvious to one skilled in the art at the time of invention to incorporate McCullough's modulation technique into Zhang's invention.

***Conclusion***

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin M. File whose telephone number is (571)272-6040. The examiner can normally be reached on M-F 10:00-6:30.

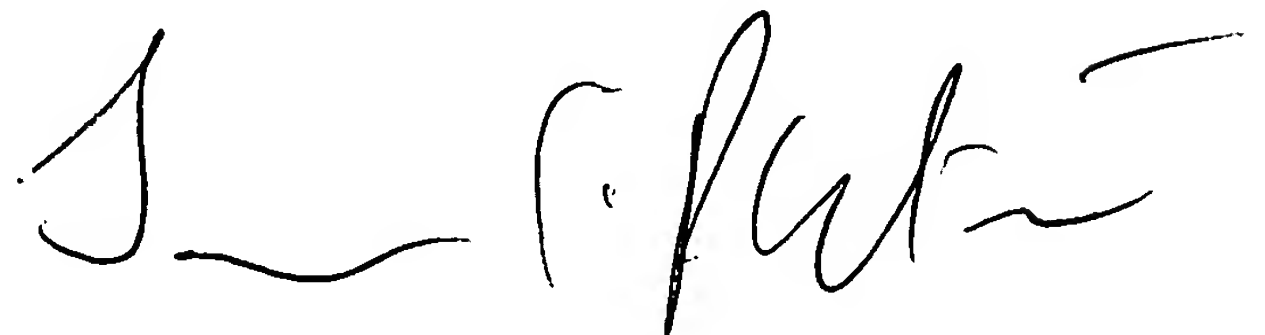
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Erin M. File

EF

4/21/2006



**JAY K. PATEL  
SUPERVISORY PATENT EXAMINER**